ON SOME AUSTRALIAN CLADOCERA.

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(Communicated by Prof. S. J. JOHNSTON, D.Sc.)

With Plates XL–XLII.

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Introduction.

In the beginning of 1917 I undertook to work on the life-history of the nematode parasite of cattle, *Onchocerca gibsoni*, under the direction of the Special Committee appointed by the Commonwealth Advisory Council of Science and Industry. In the course of this work it became necessary to examine the fresh-water crustacea in the district in which the work was being carried on. This work, begun in Kendall, on the North Coast, N. S. Wales, was continued at the Zoological Laboratory at the Sydney University.

Material Investigated.

The greater part of the material investigated was obtained from ponds and creeks at Kendall, where crustacea were very abundant; five of the new species here described were collected in that locality. Collections were also made from a creek at Nelson's Bay, Port Stephens; from the Lett River, Blue Mountains; Centennial Park, Sydney; and from a pond in the Sydney University grounds. Miss Somerville, B.Sc., kindly made collections for me in the following places and forwarded the preserved material. Two tubes from Mudgee, and two from Bathurst, collected in December, contained very few crustacea; in collections from Cumbalum, Casino, and Byron Bay made in January, they were fairly abundant, and two tubes from Corowa obtained in March were very rich in Crustacea. All the localities cited are in New South Wales.

Methods Employed.

When possible the material obtained was examined alive, and samples of it were kept alive for some time; this was always the case at Kendall, and with the collections made at Centennial Park and the University. The specimens were drawn with the aid of a camera lucida while still alive. Various means of fixing and preserving were tried, such as glycerine alcohol, sublimate acetic and Carl's fixative; of these the glycerine alcohol was found to be the most satisfactory. Specimens that were unstained and had been fixed in glycerine alcohol were placed under a bell-jar until the alcohol had evaporated and were then mounted in glycerine jelly; these proved to be quite satisfactory, and the more delicate crustacea were always mounted in this way, as the staining process injured their shape and internal structure. The stains used were hæmatoxylin and borax carmine; the latter proved more suitable for those parts that needed closer examination.

I have to thank Professor S. J. Johnston for his valuable advice and assistance in the preparation of the paper. The Cladocera comprised in this paper are—

Family Daphnidæ.

Daphnia carinata King
Scapholeberis kingi Sars
Simocephalus elizabethæ King
„ *australiensis* Dana
Simocephalus acutirostratus King
Ceriodaphnia spinata sp. n.
Moina tenuicornis Sars

Family Lyncodaphnidæ.

Ilyocryptus longiremus Sars
Macrothrix spinosa King

Family Lynceidæ.

Camptocercus australis Sars
Acroperus avirostris sp. n.
„ *sinuatus* sp n.
Alona wallaciana sp. n
„ *kendallensis* sp. n.
„ *longirostris* sp. n.
„ *whiteleggii* Sars
„ *affinis* Leydig
„ *cambouii* Richard
Alonella clathratula Sars
Graptoleberis testudinaria Fischer
Dunhevedia crassa King
Pleuroxus reticulatus sp. n.
Chydorus denticulatus sp. n.
„ *clelandi* sp. n.
„ *globosus* Baird
„ *ovalis* Kurz

Family DAPHNIDÆ.

Genus DAPHNIA Müller.

Daphnia carinata King

This form was first described by King in the *Proc. Roy. Soc. Van Diemen's Land*, Vol. II, Part II.[6] A more detailed description was later given by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney,"[11] and in "*Daphnia carinata* King."[18]

This species was fairly abundant in two tubes of crustacea obtained at Corowa in March. It had been recorded previously from Palestine and Syria, and in Australia from the Waterloo Swamps, Sydney, and at St. Arnaud, Fairfield, and Cheltenham in Victoria.

Genus SCAPHOLEBERIS Schoedler.

Scapholeberis kingi Sars.

This species was described by Sars in "Freshwater Entomostraca from China and Sumatra."[22] It had formerly been described by King as *Daphnia mucronata* in the *Proc. Roy. Soc. Van Diemen's Land*.[6]

This form was found in abundance at Kendall from October to June. Outside Australia it has been recorded from South Africa and Sumatra.

Genus SIMOCEPHALUS Schoedler.

Simocephalus elizabethæ King.

This form was first described by King[6] as *Daphnia elizabethæ*. It was later more fully described by Sars in "Additional Notes on Australian Cladocera."[13]

Numerous specimens of this species were found in a pond in the grounds of Sydney University in June, and from Mudgee in December. King records finding this species at Newtown, Parramatta, near Stroud, and at Port Stephens.

Simocephalus australiensis Dana.

This species was first described by Dana, in the "U.S. Exploring Expedition," Crustacea II, as *Daphnia australiensis*. A more extended description with good figures was later given by Sars in "Additional Notes on Australian Cladocera."[13]

This form was found in abundance at Kendall from October to June. A few specimens were obtained from a pond at Sydney University in June, and numerous ephippia-bearing specimens were collected at Corowa in March. This species has been recorded from South Africa, from Gracemere in Queensland, and from Sydney.

Simocephalus acutirostratus King.

King first described this form in the *Proc. Roy. Soc. Van Diemen's Land.*"[6] It was later more fully described by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney."[11]

A few specimens of this form were obtained at Casino in January. The size of these was smaller than is usual in this species, the largest specimen obtained being only 2 mm. long. King records this species from Denham Court, N. S. Wales, and Sars from a waterhole in Bourke Street, Sydney.

Genus CERIODAPHNIA Schoedler.

Ceriodaphnia spinata sp. n.

(Plate XL, figs. 1, 2.)

The length of the adult female is 1·2 mm. The carapace, seen laterally, is rounded oval in outline, dorsal and ventral margins are evenly curved, the posterior prominence very distinct and rather short pointed; it is situated above the middle axis of the body.

The head, as compared with other species of the genus, is not very much depressed; it is distinctly marked off from the carapace dorsally by a comparatively deep groove.

The reticulation of the carapace is not very distinct. The free edges of the valves are minutely denticulate. The eye is large with conspicuous crystalline lenses. The ocellus is very small, subrectangular. The antennules are short and somewhat rectangular, each has a spine at the edge and is tipped with a bundle of bristles.

The tail-piece (fig. 2) is strongly built, and its posterior edge is fairly straight. There are ten spines on the infra-anal margin; these are strong and curved, but the tenth is very small. The end claws are long and curved. Each bears a row of small spinules along its whole length; no secondary denticles are present at their base. The caudal setæ are long and feathered anteriorly. There are three feathered spines on the supra-anal prominence, and two on the posterior. As many as six summer eggs may be present. There is one winter egg in the ephippium.

This species somewhat resembles *Ceriodaphnia reticulata* Jurine. In general shape, the head is more erect and the posterior prominence more distinct and pointed in *C. spinata*. It also differs in the presence of denticles on the margin of the carapace, a greater number of anal spines and the row of tiny spinules along the whole length of the end-claws instead of the row of seven spinules near the base as in *C. reticulata*.

Specific Characters.—Carapace, seen laterally, rounded oval in outline, with the posterior prominence above the middle axis of the body, very distinct. Head not very much depressed. Surface of the carapace not distinctly reticulated; margins minutely denticulate. Eye large, ocellus very small. Antennules rectangular, each with a spine and a bundle of bristles. Tail-piece strong, ten infra-anal spines present; end-claws with a row of small spinules. Average length 1·2 mm.

Locality.—Corowa, collected in March. Type specimen in the Australian Museum, No. P 4327.

Genus MOINA Baird.

Moina tenuicornis Sars.

This form was described by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney."[11]

This species was obtained at Corowa in March, where it was present in abundance. It has been recorded from South Africa and from a waterhole in Bourke St., Sydney.

Family LYNCODAPHNIDÆ.

Genus ILYOCRYPTUS Sars.

Ilyocryptus longiremus Sars.

Sars described this species in "Additional Notes on Australian Cladocera."[13]

This species was collected at Kendall in November and December, and it was also found at the University and Centennial Park in June. It is also recorded from North and South America, East Africa, Celebes, and from Gracemere, Queensland.

Genus MACROTHRIX.

Macrothrix spinosa King.

King first described this form in his paper "On Australian Entomostracans."[6] Sars gave a more extended description in "Additional Notes on Australian Cladocera."[13]

A few specimens of this form were obtained at Corowa in March. King records this species from Liverpool and Sydney, and Sars from the Crescent Lagoon near Rockhampton, Queensland. Outside Australia it has been recorded from South America and South Africa.

Genus CAMPTOCERCUS Baird.

Camptocercus australis Sars.

This form was described by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney,"[11] from a single specimen.

A single specimen of this form was found at Kendall in October, and a number at Port Stephens in September. Sars records this species from Centennial Park, Sydney.

Genus ACROPERUS Baird.

Acroperus avirostris sp. n.

(Plate XL, figs. 3, 4.)

The length of the adult female is from 0·57 – 0·68 mm. The carapace is compressed, and viewed laterally, the shape is truncated oval; the greatest height is more than half the length and occurs in front of the middle. The dorsal margin is fairly strongly arched; the ventral edges of the valves are convexly curved in front, but straight for the remainder of their length; the posterior edges are obliquely truncated, slightly curved. The postero-dorsal angle is very obtuse, almost obliterated; the postero-ventral angle is distinct and bears two denticles on each valve.

The head is bent down, the dorsal margin forming an even curve with that of the carapace. The rostrum is wide and blunt.

The surface of the carapace is marked by a series of distinct oblique striations. The ventral margins of the valves are fringed with a row of long bristles.

The eye is of moderate size; the ocellus is only slightly smaller and situated closer to the eye than to the end of the rostrum.

The antennules are long and slender, reaching nearly as far as the tip of the rostrum; the tuft of sensory bristles at their apex extends beyond the rostral tip.

The antennæ are long and slender with long swimming bristles. There are three bristles and a spine on the terminal segment of the outer branch, and three bristles on

the terminal segment of the inner branch. The lip-plate is somewhat triangular in form.

The tail-piece (fig. 4) is moderately long and broad; the supra-anal angle is distinct but somewhat blunt. There are no spines present on the infra-anal margin, but above it is a row of about eleven bundles of fine spinules of which the outermost are longer and larger than the rest. The end-claws are situated on a prominence; they are very long, straight for the greater part of their length, with gently curved tips; each bears two denticles, one at the base and one finer than the other about the middle of its length; there is a row of spinules between these two denticles.

This species resembles most nearly *Acroperus harpæ* Baird, described in the "Natural History of the British Entomostraca."[1] The general shape is different; the head comparatively smaller, the eye and ocellus larger and not so far removed from the dorsal margin. The depression of the posterior edge as seen in *A. harpæ* is absent. The antennule has no long sensitive papilla.

Specific Characters.—Carapace, seen laterally, truncated oval; dorsal margin arched, ventral edges of the valves convex in front; posterior edges slightly curved, oblique. Postero-ventral angle armed with two denticles. Head bent down, rostrum blunt. Eye moderately large, ocellus slightly smaller. Antennæ reaching nearly as far as the tip of the rostrum. Surface of the carapace obliquely striated. Tail-piece provided with eleven comb-like bundles of spines, end-claws long, each with two denticles and a row of spinules. Two eggs present in the brood-pouch lying side by side. Average length 0·62 mm.

Locality.—Collected at Port Stephens, Kendall and Cumbalum in the spring and summer months. Type specimen in the Australian Museum, No. P 4328.

Acroperus sinuatus sp. n.

(Plate XL, figs. 5, 6.)

The length of the adult female reaches 0·59 mm. The carapace is compressed; seen from the side, its shape is truncated oval. The dorsal margin is only slightly arched; the ventral edges of the valves are straight for the greater part of their length and form an abrupt angle with the anterior free edges. The posterior edges are sinuated, forming an obtuse angle with the ventral edge, convex about the middle, concave dorsally, meeting the dorsal margin at almost a right angle. There are no denticles present on the postero-ventral angle.

The head is rather large; the dorsal margin forms an even curve, continuous with that of the carapace. The anterior contour of the head is almost vertical. Inferiorly the head terminates in a very blunt rostrum pointing downwards. The sculpture of the carapace consists of distinct, oblique striations.

The eye is large, with conspicuous crystalline lenses; the ocellus is smaller and situated slightly nearer to the tip of the rostrum than to the eye.

The antennules are long and reach beyond the tip of the rostrum; each bears a tuft of sensitive bristles at the apex.

The tail-piece (fig. 6) is more slender than in the foregoing species, and the supra-anal angle is not so distinct, but the armature closely resembles it, there being eleven lateral bundles of spines present; the end-claws are long, each bearing two denticles, one at the base and the other about the middle of its length; a row of spinelets is present between the two denticles.

There may be two summer eggs present in the brood pouch, one in front of the other.

This form differs from *A. avirostris* in the peculiar shape of the posterior edges and the absence of denticles on postero-ventral angles. It also differs in the position of the ocellus and the length of the antennules.

Specific Characters.—Viewed laterally, the carapace has a truncated oval form; the dorsal margin is slightly arched, the ventral edges of the valves fairly straight, forming an abrupt angle with the anterior edges, *posterior edges sinuated, no denticles* present on the postero-ventral angle, shell obliquely striated. Head bent down terminating in a blunt rostrum. Ocellus situated *nearer the tip of the rostrum* than to the eye. Antennules reaching *beyond the tip* of the rostrum. Tail-piece long and narrow, eleven comb-like bundles of lateral spines present; end-claws long with two denticles one at the base and one at the middle with a row of spinelets between the two. Length of the adult female 0·59 mm.

Locality.—Kendall, collected in November. Type specimen in the Australian Museum, No. P 4329.

Alona wallaciana sp. n.

(Plate XLI, figs. 7, 8.)

The length of the largest specimen examined is 0·49 mm. The carapace is compressed, and, viewed laterally, has an oblong oval form; the greatest height 0·31 mm. is slightly in front of the middle. The dorsal margin is evenly arched; the ventral edges of the valves are almost straight; the posterior edges slightly arcuate, evenly rounded off at the corners.

The head is hood-like, its dorsal margin forming a continuous, even curve with that of the carapace; inferiorly the head terminates in an acute rostrum which does not reach ventrally as far as the inferior edges of the valves.

The surface of the carapace is marked by numerous small pits arranged close together. The ventral edges of the valves are fringed with a row of fine bristles.

The eye is moderately large; the ocellus is about the same size, square in shape and situated nearer to the eye than to the tip of the rostrum.

The antennules are short and thick, not nearly reaching the tip of the rostrum. They bear a number of bristles at the tip. The antennæ are small; in structure they agree with those of other species of the genus. The lip-plate is comparatively large and rounded.

The tail-piece (fig. 8) is long and slender, slightly narrowed towards the apex. There are about fifteen pairs of spines present on the infra-anal margin, those nearer the end-claws being larger and stronger; above the anal spines is a row of marginal combs. The end-claws are very long, curved at the tips; a strong secondary denticle is present at the base of each reaching to half the length of the end-claws.

This species agrees most nearly with the Australian form *Alona archeri* described by G. O. Sars in "Additional Notes on Australian Cladocera."[13] It differs from the latter in the following details:—The sculpture of the shell has not the longitudinal rows of pits characteristic of *A. archeri*, the pits being massed together in an irregular manner. The ocellus is very much larger, square in shape and situated comparatively closer to the eye. The proximal spines of the tail-piece lack spinules on the upper edge; the lateral spines of *A. archeri* are replaced by combs in *A. wallaciana* and the secondary denticles at the base of the end-claws are longer and stronger.

Specific Characters.—Carapace seen laterally is oblong oval; dorsal margin arched, ventral edges straight, corners evenly rounded. Surface of the carapace marked with

irregular pits. Ocellus equal in size to the eye, square shaped. Antennules short, not reaching to the end of the rostrum. Tail long and slender; fifteen pairs of anal spines and a row of lateral combs present; end-claws long with strong secondary denticles. Colour yellow. Length of adult female 0·49 mm.

Locality.—Kendall, collected in May from creeks on Mr. Wallace's farm. Type specimen in the Australian Museum No. P 4330.

Alona kendallensis sp. n.

(Plate XLI, figs. 9, 10.)

The length of the adult female is 0·88 mm. Seen laterally, the carapace is somewhat quadrangular, obliquely truncated behind. The greatest height, 0·49 mm., occurs behind the middle. The dorsal and ventral edges of the valves are almost straight, the posterior edges are slightly arcuate.

The head is somewhat depressed with an acute rostrum pointing downwards and almost reaching the ventral edges of the valves. The forehead is very sloping, joining the dorsal edge of the carapace somewhat abruptly. The surface of the carapace is marked by distinct longitudinal striations. The ventral edge of each valve bears a row of long bristles, which are continued round the postero-ventral angle.

The eye is of moderate size, with conspicuous crystalline lenses. The ocellus is very slightly smaller than the eye, and situated much nearer to it than to the tip of the rostrum. The antennules are narrow, and extend about two-thirds the length of the rostrum. The antennæ are comparatively small; they exhibit the usual structure.

The tail-piece (fig. 10) is very strongly built, nearly uniform in width throughout. There are twelve pairs of

spines on the infra-anal margin with spinules on the posterior border of each. The end-claws are strong with a very well developed denticle at the base of each. A row of about twelve marginal combs is present.

This species somewhat resembles *Alona whiteleggii* Sars, but differs in the greater width of the posterior edges, the straight dorsal margin and the more depressed head; the tail-piece is like *A. whiteleggii* in shape but has fewer spines and further these possess spinules on their posterior edges.

Specific Characters.—The carapace seen laterally, is quadrangular, very wide posteriorly; dorsal and ventral margins straight. Posterior edges arcuate. Head depressed with a long acute rostrum. Carapace longitudinally striated. Ocellus almost as large as the eye. Tail-piece large, twelve pairs of spines on the infra-anal margin, provided with spinules; twelve marginal combs present, end-claws and secondary denticles strong. Length 0·88 mm.

Locality.—Kendall, collected in October. Type specimen in the Australian Museum, No. P 4331.

Alona longirostris sp. n.

(Plate XLI, figs. 11, 12.)

The length of the specimen examined is 0·74 mm. Seen laterally, the shell exhibits an oblique oval form, obliquely truncated behind; the greatest height is 0·41 mm. and occurs just behind the middle; the dorsal margin is arched, the ventral edges of the valves are straight for the greater part of their length, curving upwards posteriorly.

The head is depressd, with an elongated pointed rostrum reaching below the ventral edges of the valves; the dorsal margin of the head forms an even curve with that of the carapace.

The surface of the carapace is not striated but marked by a number of pits; the ventral edges of the valves bear

a row of bristles and there is a group of bristles on the postero-ventral corner.

The eye is of moderate size; the ocellus is smaller and situated closer to the eye than to the tip of the rostrum.

The antennules are not as long as the rostrum, but the sensory tufts of filaments at their apices reach beyond its tip.

The tail-piece (fig. 12) is strongly built, of almost uniform width throughout; the supra-anal angle is not very distinct; there are twelve pairs of short thick spines present on the infra-anal margin, and also a row of about ten lateral combs; the end-claws are strong, each with a secondary denticle which reaches half its length; the denticles each bear a row of spinules.

Specific Characters.—Carapace seen laterally oblong oval, obliquely truncated behind, dorsal margin arched, ventral straight, curving posteriorly. Head depressed. Rostrum reaching below the ventral edges of the valves. Surface of the carapace pitted. Ocellus smaller than the eye, closer to it than to the tip of the rostrum. Tail-piece broad, with twelve pairs of short, thick infra-anal spines, and ten lateral combs; end-claws strong; secondary denticles long, each bearing a row of spinules.

Locality.—This form was collected at Byron Bay in January. Type specimen in the Australian Museum, No. P 4332.

Alona whiteleggii Sars.

This species was described by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney."[11]

This form was abundant at Kendall during the summer months. It is recorded by Sars from Centennial Park, Sydney.

Alona affinis Leydig.

This species was first described by Leydig in "Naturgeschichte der Daphniden," 1860. Lilljeborg gives a detailed description with good figures in "Cladocera sueciæ."[7]

Several specimens of this large form were obtained at the Lett River, Blue Mountains. It has been recorded from Europe, Asia, North and South America, South Africa and Greenland.

Alona cambouii Richard.

This form was first described by Richard in "Nouveaux Entomostracées d'eau douce de Madagascar." Sars gives a good figure of it in "Pacifische Plankton-Crustaceen."[15]

A few specimens of this species were obtained at Port Stephens in August. It has been recorded from Madagascar, Palestine, South America, New Zealand.

Genus ALONELLA Sars.

Alonella clathratula Sars.

This form was described by Sars in "Freshwater Entomostraca from the neighbourhood of Sydney."[11]

This species was found in abundance at the Lett River in September. A few specimens were obtained at Kendall in October. It has been recorded from South America and in Australia from the Maroubra Swamp, Sydney.

Genus GRAPTOLEBERIS Sars.

Graptoleberis testudinaria Fischer.

This form was first described by Fischer in "Mém de l'Acad. Impér. de St. Petersb. des Savants ètrangers, T. vi, page 191. Lilljeborg gives a detailed description with good figures in "Cladocera sueciæ."[7]

A solitary specimen of this form was obtained from a pond in the University grounds in June. It has been

recorded from Europe, North and South America, Asia, Iceland and the Azores.

Genus DUNHEVEDIA King.

Dunhevedia crassa King.

This form was first described by King in "Australian Entomostracans."[6] A more detailed description is given by Sars in "Additional Notes on Australian Cladocera."[13]

This species was obtained at Sydney University in June, and at Cumbalum in January. King records this form from Dunheved (St. Mary's, N.S.W.), and Varraville near Denham Court, N.S.W. It has also been recorded from Ceylon.

Genus PLEUROXUS Baird.

Pleuroxus reticulatus sp. n.

(Plate XLII, figs. 13, 14.)

The length of the adult female is 0·31 mm. Seen laterally, the carapace is oblong oval in shape, the greatest height being 0·20 mm., and occurring somewhat in front of the middle.

It is narrowly truncated posteriorly, the posterior edges being straight. The dorsal margin is strongly arched, the ventral edges of the valves are straight in the posterior part, curving up to the anterior edges somewhat suddenly. A blunt denticle is present at the postero-ventral corner.

The dorsal margin of the head forms a continuous, even curve with that of the carapace; the rostrum is long, slender and sharply pointed. The surface of the carapace is marked by a reticulate sculpturing as well as by a number of minute pits joined together so as to form a superimposed network of marks. The ventral edges of the valves are fringed each with a row of bristles.

The eye is large; the ocellus is about half as large and is situated very much closer to the eye than to the tip of the rostrum.

The antennules, which are tipped with a bunch of sensory papillæ, extend about half the length of the rostrum.

The antennæ have the structure characteristic of the genus; they are comparatively short.

The tail-piece (fig. 14) is moderately strong and of uniform breadth throughout. The supra-anal angle which is distinct, is an obtuse angle. The end-claws are situated on a little prominence; they are rather strong and slightly curved; each has a rather large denticle removed a little from the base; there is also a very small secondary denticle at the base. The spines on the infra-anal margin are fairly short; there are about eleven pairs present; seven comb-like groups of bristles occur on either side of the anal furrow.

This species in many ways resembles the larger form *Pleuroxus inermis*, described by G. O. Sars in "Freshwater Entomostraca from the neighbourhood of Sydney." It differs however in the presence of a denticle on the postero-ventral corner and in the very different sculpturing of the carapace.

Specific Characters.—Carapace seen laterally oblong oval in shape; narrowly truncated posteriorly; dorsal margin arched; ventral edges curved, protuberant in front; postero-ventral corner with a blunt denticle. Head small, terminating in a long slender rostrum. Sculpture of valves consists of a reticulation together with pits.

Eye of moderate size, ocellus smaller, much closer to the eye than to the end of the rostrum. Tail-piece of uniform breadth; spines on the infra-anal margin fairly small, seven lateral combs; terminal claws with two secondary denticles each, one large one small. Length 0·31 mm.

Locality.—Collected at Port Stephens in August. Type specimen in the Australian Museum, No. P 4333.

Genus CHYDORUS Baird.

CHYDORUS DENTICULATUS sp. n.

(Plate XLII, figs. 15, 16.)

The length of this form reaches ·46 mm. The shape is sub-globular; seen laterally, the dorsal margin of the carapace is strongly arched, forming a very obtuse angle with the posterior edges, the ventral edges of the valves are curved anteriorly straight for the greater part of their length, also forming an obtuse angle with the posterior edges, the latter are slightly curved.

The head is small; the dorsal margin forms an even curve with that of the carapace, the rostrum is long and narrow slightly recurved, appressed to the trunk. The eye is of moderate size; the ocellus is smaller, rounded in shape and situated twice as far from the end of the rostrum as from the eye.

The surface of the carapace is marked by small pits which are larger and more conspicuous in the dorsal part, a few striations present in the antero-ventral portion. The ventral edges of the carapace are beset with feathery hairs and the anterior half has in addition a row of small denticles.

The antennules are small and reach less than half the length of the rostrum.

The tail-piece (fig. 16) is strongly built; behind the anal prominence the dorsal edge is a pronounced S-shape; there is a very distinct supra-anal angle. There are about fifteen groups of spines present on the infra-anal margin. The end-claws are long, and have one long and one short accessory denticle at the base of each.

Two summer eggs are present in the brood-pouch.

Specific Characters.—Shape sub-globular; dorsal margin of the carapace arched, ventral curved anteriorly and posteriorly straight in the middle, narrow posterior edges.

Rostrum long and recurved. Surface of the carapace pitted. Ocellus smaller than the eye; nearer it than to the tip of the rostrum. Antennules less than half the length of the rostrum. Tail-piece strong, S-shaped behind the anal prominence, fifteen groups of anal spines, end-claws each with one large and one small denticle at the base. Length ·45 mm.

This form was collected from a pond at Sydney University in June. Type specimen in the Australian Museum, No. P 4334.

Chydorus clelandi sp. n.

(Plate XLII, figs. 17, 18.)

This is a very small form, the largest specimen examined only attaining 0·38 mm. Seen laterally, the carapace has a rounded form; the dorsal margin is strongly arched, joining the posterior edges at an obtuse angle; the ventral edges of the valves are also strongly arched; the posterior edges are very short and gently curved.

The head is produced into a long acute rostrum, closely appressed to the trunk; the dorsal margin forms an even curve with that of the carapace.

The eye is large for such a small form; the ocellus is slightly smaller and situated nearer to the eye than to the tip of the rostrum.

The antennules are short and rather thick, reaching about half the length of the rostrum.

The surface of the carapace is pitted. The carapace is thickened along the ventral and posterior edges. The ventral edges bear a row of short bristles.

The tail-piece (fig. 18) is comparatively wide, with a very prominent supra-anal angle; twelve spines are present on the infra-anal margin. The end-claws are long, with

spinules along half their length; one denticle is present at the base of each.

Specific Characters.—Carapace seen laterally rounded, dorsal and ventral margins curved, posterior edges short. Rostrum long and narrow. Eye large. Antennules short and thick. Carapace pitted. Tail-piece with a prominent supra-anal angle; twelve spines on the infra-anal margin. End-claws long with one secondary denticle at the base of each, and a row of spinules along half their length.

This form was found at Kendall, Lett River and Sydney University pond. Type specimen in the Australian Museum, No. P 4335.

Chydorus globosus Baird.

This form was first described by Baird in the "Natural History of the British Entomostraca."[1] Lilljeborg gives a full description with good figures in "Cladocera Sueciæ."[7]

Several specimens of this form were found at Sydney University in June. It has been recorded from Europe and from Centennial Park and Botany near Sydney.

Chydorus ovalis Kurz.

This form was first described by Kurz in "Dodekas neuer Cladoceren." Lilljeborg gives a detailed description in "Cladocera Sueciæ."[7]

This species was present in a tube of material collected at Centennial Park in June. It has been recorded from several European countries.

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Explanation of Plates.

The drawings which were made by Mr. F. W. Atkins of the Technical High School, Sydney, were all done with the help of the camera lucida.

Plate XL.

Fig. 1. *Ceriodaphnia spinata* × 65

,, 2. Tail-piece of *Ceriodaphnia spinata* × 90

,, 3. *Acroperus avirostris* × 83

,, 4. Tail-piece of *Acroperus avirostris* × 237

Fig. 5. *Acroperus sinuatus* × 65
„ 6. Tail-piece of *Acroperus sinuatus* × 303

Plate XLI.

Fig. 7. *Alona wallaciana* × 100
„ 8. Tail-piece of *Alona wallaciana* × 243
„ 9. *Alona kendallensis* × 70
„ 10. Tail-piece of *Alona kendallensis* × 240
„ 11. *Alona longirostris* × 85
„ 12. Tail-piece of *Alona longirostris* × 150

Plate XLII.

Fig. 13. *Pleuroxus reticulatus* × 178
„ 14. Tail-piece of *Pleuroxus reticulatus* × 265
„ 15. *Chydorus denticulatus* × 80
„ 16. Tail-piece of *Chydorus denticulatus* × 300
„ 17. *Chydorus clelandi* × 87
„ 18. Tail-piece of *Chydorus clelandi* × 335

Fig. 1

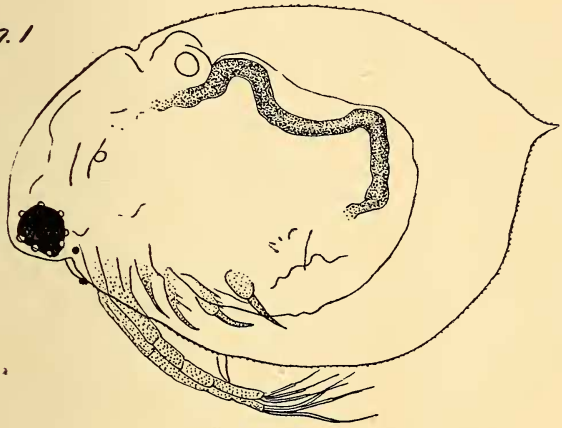


Fig. 2

Fig. 3

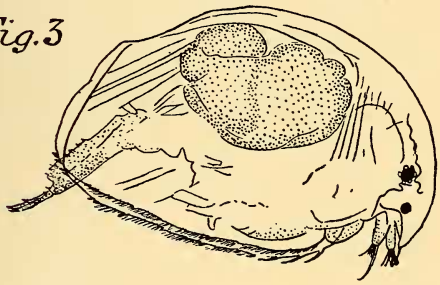
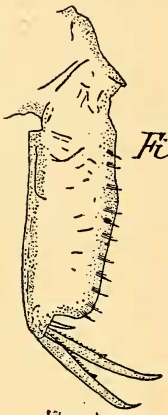


Fig. 4



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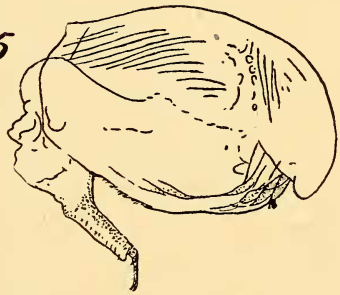

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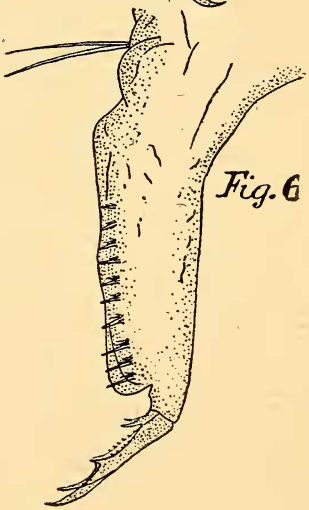

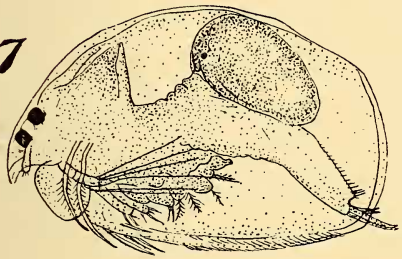

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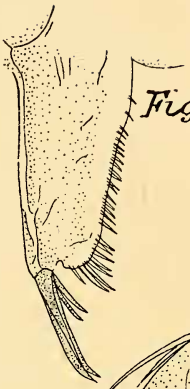

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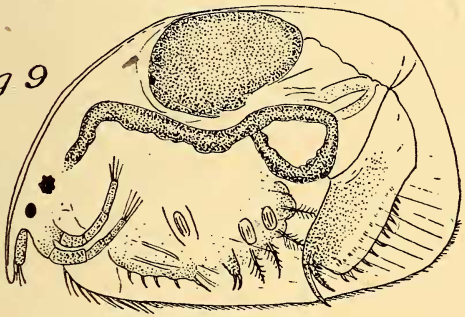

Fig 9

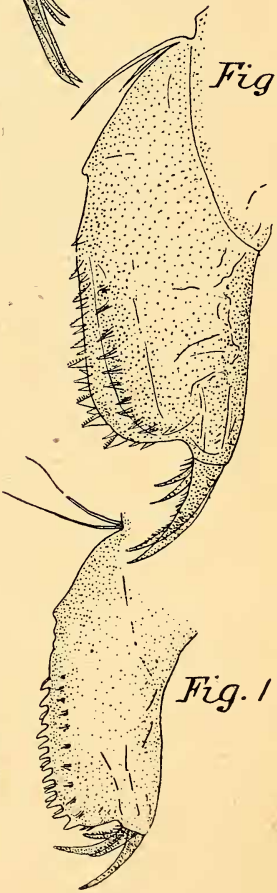

Fig. 10

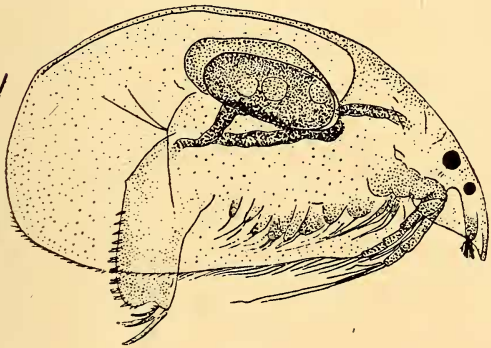

Fig. 11

Fig. 12

Fig. 13

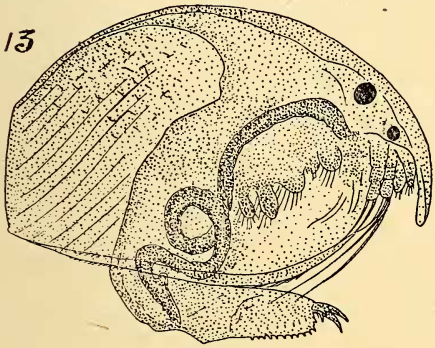

Fig. 14.

Fig. 15

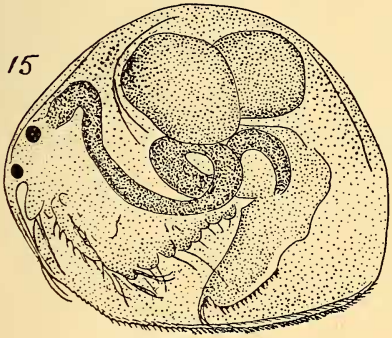

Fig. 16

Fig. 17

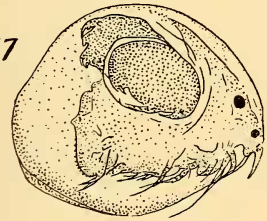

Fig 18